ELECTRICAL & COMPUTER ENGINEERING

N E W S L E T T E R

1997 Newsletter

A Message

From the Interim chair

It is with great pleasure that I send you this newsletter about the status of the Electrical & Computer Engineering (ECE) Department this past year. Our graduates are in high demand with starting salaries in the $40,000 range. Our research support exceeded $1 million, and we had 100% job placement for our undergraduate and graduate students. In addition, the level of our outreach educational programs and industrial collaborations has reached an all-time high.

While we have become more successful and efficient, the number of students has dropped at an alarming rate. In 1985, we had more than 300 students - today we are down to approximately 170. Of course, this has been a national trend and it is not unique to us. Now that signs of increased interest in engineering are emerging, it is imperative that we be in a position to attract more highly qualified students from Maine and across the country.

We have a plan to aggressively recruit qualified students for both the undergraduate and graduate program. We want to build a national reputation for our department in both education and research. An important part of our plan is to make more scholarships available in the first year and throughout our entire undergraduate program. This will increase our ability to compete successfully with other institutions.

To succeed in this endeavor, we need help from every one of our alumni. In the next few weeks you will receive a fund-raising letter explaining our goals. I would like you to consider seriously how you can help us build a stronger department for future generations.

Sincerely,

Mohamad T. Musavi

Professor and Interim Chairperson

Online Resources....	*Contact:*
Our official home page on the web, which is continuously updated, provides the latest information about our program, current research, computer resources and schedules. There is also an online directory which lists Alumni/ae email addresses and their home pages. It is a great resource to locate your friends. If you haven't visited our home page, please do so and fill out the electronic form. To start, point your web browser to ***http://www.eece.maine.edu*** and click on the *Alumni/ae* link.	*Mohamad Musavi* *5708 Barrows Hall* *University of Maine* *Orono, ME 04469-5708* *Tel: (207) 581-2243* *Fax:(207) 581-2220*

Email: musavi@eece.maine.edu

Enrollment Update

As of September 1997 we have 27 graduate students, 36 seniors, 2 juniors, 51 sophomores, and 41 first-year students for a total of 187. Included in these figures are 72 computer engineering majors and 5 ELE/CEN majors. We have 20 international students, 7 graduate and 13 undergraduate. The freshman class had an average SAT score of 1199.

Personnel Update

John Field (*johnf@eece.maine.edu*) was appointed as the Interim Dean of the College of Engineering. **Mohamad Musavi** (*musavi@eece.maine.edu*) was appointed as the Interim Chairperson of the department. **James Patton** (*patton@eece.maine.edu*) was appointed as the Interim Director of the University Instructional Technologies and his responsibilities in the department were reduced by 50% .

Edmund Sheppard retired after 35 years of service and was awarded the title of Emeritus Professor of Electrical Engineering. **William Peake** who officially retired earlier in 1991 but taught courses for the department decided not to return. He also is an Emeritus Professor of Electrical Engineering.

Janice Gomm (*janice@eece.maine.edu*) who joined the Department in 1983 as a Secretary was promoted to Administrative Assistant in December 1996. **Susan Niles** (*susan@eece.maine.edu*) who worked for department in 1979-1983 was rehired in January 1997.

Pluralism Activities

The department actively continued its pluralism activities last year: A female upper-class student sponsored weekly dinner and social gatherings with first and second year students. A female first year ECE student hosted a weekend with six high school female seniors. From these six, three were accepted to the university, one is in ECE and the other two are in general engineering. A female ECE student called every female student who had been accepted to the ECE department for Fall 1997. The department NSF-REU undergraduate research program actively advertised for minority and female students; several qualified applicants responded and performed research in the summer of 1997.

Awards Received

Fred Irons received the University's Presidential Teaching Award. **Heather Clark** received the Outstanding Student in the College of Engineering award.

The following students received awards at the spring 1997 awards banquet.

Shawn Upton (Castle), **Gina Kelso** (Harold H. Beverage), **Robert Tukey, Jr.** (Walter Joseph Creamer), **Alan Fern** (Walter Joseph Creamer), **Maurice Kinney** (Howard A. Crosby/Kenneth L. Parsons), **Andrew Piper** (David Dunlap Holmes), **Scott Saucier** (David Dunlap Holmes), **Heather Clark** (Robert N. Haskell), **Robert Reynolds** (Robert N. Haskell), **Seth Pouwels** (Robert N. Haskell), and **Aaron B. Johnson** (Louise H. Morrison). **Jamie L. Guevara** received the Henry and Grace Butler award in the summer of 1997.

The following 1st Year Students also received awards. **Aaron B. Johnson** (Walter W. Turner), **Adrian C. Smith** (Waldo Libby), and **Matthew S. Reynolds** (Carleton M. Brown).

Master of Science Degree for Southern Maine

This Fall, the Department of Electrical and Computer Engineering at the University of Maine and the Department of Engineering at the University of Southern Maine will cooperate in making available the University of Maine's Master of Science degrees in Electrical Engineering (MSEE) and Computer Engineering (MSCEN) throughout the State but with particular emphasis on the Greater Portland area. All courses will be taught live using compressed video and will originate from either Orono or from the National Semiconductor training site in South Portland. Courses originating at the National Semiconductor training site will be taught by USM faculty while those originating from Orono will be taught by UMaine faculty. A minimum of one course will be offered each term and one during the summer. This degree offering is an attempt to bring a needed educational experience to the State and particularly to the greater Portland area. It is the intention of both universities to provide a program which is flexible, accessible and which meets the needs of working professionals. Both universities are committed to its success.

Student Recruitment

We continue to actively recruit new students in a number of ways. Letters are sent to all students who are accepted to our program and follow up calls are also made. We even make a point to have undergraduate female students call prospective female students. Our Young Scholars Program that brings sophomore high school students to the University for two weeks of hands-on engineering experience has been an effective recruitment tool for the last five years. The department also continues to organize tours for high school students who visit the campus. In addition, we are providing opportunities for high school students to be involved in different research projects at the department.

Accreditation and Program Reviews

The department's next accreditation visit is in 2001. A new guideline, ABET Engineering Criteria 2000, with new requirements will be published in January 1998. The department will soon start to prepare itself to address new ABET requirements.

Anticipated Initiatives

Our major plans for 1998 are: **PhD program** - We are planning to revitalize our efforts in implementing the program that was approved by the Board of Trustees in 1994. This requires the university commitment for hiring new faculty and increasing our base budget for graduate students and equipment.

New Faculty – We have started advertising and are planning to hire two new faculty members. One is a tenure track through the DOE/EPSCoR Intelligent Systems project and the other is a temporary position that became available by the appointment of John Field as the College Interim Dean.

Engineering Research Center - We are planning to follow up on our early efforts and evolve our current DOE/EPSCoR Intelligent Systems project into an engineering research center for State manufacturing sector, especially the pulp and paper industry.

Outreach Graduate Program – We are planning to make our graduate program available throughout the state but with particular emphasis on the Greater Portland area. This effort is in collaboration with the University of Southern Maine Department of Engineering.

Microelectronics Concentration – In collaboration with National Semiconductor and Fairchild in South Portland, we are planning to develop a Microelectronics concentration area in the department.

Workshop on Intelligent Systems a Success

A workshop on "*Intelligent Systems For Industrial Applications*" was held on September 25th at the new Soderberg Center, Jeness Hall. This workshop presented the results of many applications to process industries. In addition, it acquainted attendees with the basics of these concepts and the benefits they offer. Attendees also had the opportunity to pose questions to leading national researchers in the field. Additionally, they learned from the experience gained by industrial manufacturers who had applied this technology. Presenters included **Ms. Anne Gould** of S.D. Warren, **Dr. Jim Keeler** from Pavilion Technologies, Houston, TX, **Mr. Eric Lightner** of DOE, **Dr. Kumpati Narendra** from Yale University

and our very own **Dr. Bruce Segee**. The workshop was in part funded by U.S Department of Energy Experimental Program to Stimulate Competitive Research (DOE/EPSCoR) and Maine Science and Technology Foundation, and co-sponsored by University of Maine, Instrumentation Society of America and I.E.E.E.

Prof. Musavi working with students in the Intelligent Systems laboratory.

NSF Young Scholars

The Department hosted the NSF Young Scholars program again this year. This two-week residential program is designed to give high school students an introduction to what engineering is all about. During their time here they learned about the various engineering disciplines, took part in career explorations, discussed engineering ethics, and took field trips where they also visited National Semiconductor, Fairchild Semiconductor, and Robbins Lumber.

Their hands-on experiences included a "motor rodeo" for which they built variable reluctance step motors with microprocessor control. They programmed the microprocessors in the C language and competed for motor speed and accuracy.

This program is valuable for students interested in engineering, and allows us to present the University in a very favorable light. Although NSF funding is no longer available, planning is underway to continue the program using a combination of industrial donations and participant fees in the summer of 1998.

National Science Foundation Research Experience for Undergraduates Program

John Vetelino conducted, with the support of the National Science Foundation, an undergraduate research participation program (NSF-REU) during the 1997 summer in the Electrical and Computer Engineering Department. This program, which was the seventeenth conducted at the University of Maine, represents the second year of a three-year continuing grant awarded to the University.

Prof. John Vetilino with NSF-REU students.

The students applying for the NSF-REU positions had achieved at least a B average in Physics, Mathematics and Engineering courses. Primary consideration was given to the grades obtained by the students in these courses. Consideration was also given to the backgrounds of the students selected so as to give special consideration to women, minorities and handicapped students. A total of 20 undergraduate students which included two women, four minorities, and two handicapped students and nine faculty members participated in the NSF-REU program which ran from June 2 – August 8, 1997. Research areas included: (1) environmental sensors; (2) robotics, computer vision and neural processing; (3) communications devices and application; (4) microprocessor/instrumentation applications; and (5) growth and characterization of thin film materials.

Faculty Activities

Eric Beenfeldt (*ericb@eece.maine.edu*) continues to teach the ECE 101 introductory course to the first year students and the ECE 400 sequence of senior project courses. ECE 101 is a hands on project oriented course designed to give students a look at many different aspects of electrical engineering. Student teams build remotely controlled cars that use infrared signals to control the car's motion. At the end of the semester each team is required to make their car perform a specific task that requires some design of their own.

In addition to this technical material, students in ECE 101 discussed ethics, various career paths, stratagies for being a successful student and how to work as a team. This portion was led by **Jamie Guevara** and **Travis Sparks**. Both are sophomore ECE students. One of the very important goals of this course is to improve retention of the first year students.

Rick Eason (eason@eece.maine.edu) has continued work in the area of robotics. One main effort has been in leading a team of students in the development of a mobile robot for entry into the annual International Ground Robotics Competition. This competition requires a robot to navigate autonomously around an 800' outdoor track marked by white lines and containing obstacles, hairpin turns, inclines, and a sandpit. The team's vehicle is based on a Honda Odyssey dune buggy frame. They have added cameras for sensing white lines, ultrasonic sensors for detecting obstacles, and a Pentium PC for intelligence. This past year's modifications focused on converting the drive system from electric motors to hydraulic motors for greater power. In addition to designing and constructing the hardware, the team has also been writing the navigation and control software. This year the team is focusing on converting the operating system to Linux and improving the software.

Rick has also been collaborating with a colleague in Japan on the development of a method of data hiding called steganography. Their method allows them to embed a large amount of information in an image without visible changes to the image. Applications include the secure exchange of information over the internet and authentication of images (watermarking).

Duane Hanselman *(duaneh@eece. maine.edu)* and **Bruce Littlefield** *(brucel@eece.maine.edu)* completed work on the "Student Edition of MATLAB 5 User's Guide". This text accompanies the Student Edition of MATLAB and has projected sales of well over 200,000 copies around the world. Duane Hanselman and Bruce Littlefield are completing work on their text "Mastering MATLAB 5: A Comprehensive Tutorial and Reference". This computer trade book is the second edition of their "Mastering MATLAB" text, which has sold over 8,000 copies in its first year in print. The latest edition is approximately 650 pages in length.
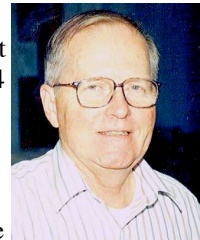
Duane presented two brushless DC motor design short courses this past year. The material presented is based in part on his book "Brushless Permanent Magnet Motor Design." The first short course was presented under the auspices of the Small Motor Manufacturers Association (SMMA), which is an association of supported by hundreds of motor manufacturers around the United States. The second short course was presented at the Incremental Motion Control Systems and Devices Symposium in San Jose.

In addition to the above work, Duane continues to consult with a variety of companies in the area of brushless DC motor design.

Don Hummels and **Fred Irons** (*irons@eece.maine.edu*) continue their work in the Communications Devices and Applications Lab. Last year saw the completion of four Masters theses in the lab. Currently, 4 graduate and 5 undergraduate students are involved with on-going CDA Lab research efforts. In April, Hummels and Irons received one of two awards out of 58 proposals submitted by U.S. researchers for a $230,683 three-year contract with the federal Advanced Research Programs Administration (ARPA). The contract is administered by the U.S. Navy and calls for the development of design procedures to improve the performance of analog to digital converters (ADCs). The limitations of ADCs are one of the major hurdles for the implementation of all-digital communications receivers. Project goals include the development of adaptive systems to recalibrate and compensate ADCs and DACs in an operational system.

Prof. Don Hummels, graduate students Jon Larabe, Daryl Rawnsly and Jim MacDonald in the Communications Devices and Applications Lab.

Work also continues on the DSP hardware/software project for NUWC. Don Hummels continues to work in developing algorithms for ocean targeting and analysis experiments. To support the project, NUWC has loaned the University one of its DSP development platforms. The system includes a UNIX-based development environment with C and assembly-language tools interfaced to an array of eight TMS320/C40 signal processors. An extensive library of routines to support a variety of real-time DSP applications was developed at UMaine over the past year, and has now become an integral part of the development of new applications at NUWC. We look forward to integrating the system into our DSP course over the coming

year.

Ryszard Lec, (*lec@eece.maine.edu*) Research Professor in EE and Technical Leader of the Industrial Process Control Sensor program, continues his research and educational efforts in the area of sensors. Currently, 4 graduate and 6 undergraduate students are involved with ongoing sensor research efforts. He and **Dr. Vetelino** completed the integration of the new and emerging technology of sensors into the undergraduate and graduate Electrical and Computer Engineering (ECE) curriculum. This is a novel interdisciplinary sensor program which combines in a synergetic way research, education and business. The research-education-business effort involves faculty and students from seven departments on campus, researchers from industrial and government laboratories, and business. The focus of the new sensor program is to expose students to the whole sensor development process. Students learn the theory, design, fabrication and testing of different types of sensors, including business and marketing aspects of high-tech products. This new interdisciplinary sensor initiative at Maine has had a positive impact on the engineering curriculum at the University and outside the University. The sensor program is open to students from other engineering departments on campus through the ECE minor degree or technical electives, and to students from other universities through the NSF Research Experience for Undergraduates program. In this new curriculum research has been chosen as a vehicle for implementing educational goals. This program has shown that research and teaching do not have contradictory goals but complement each other. Research naturally leads to the development of novel teaching methods, such as nquiry-based labs, hands-on experience, and cooperative learning, which helps a student build his/her competence and confidence. The sensor program at Maine may serve as a model for the introduction of other emerging technologies into the engineering curricula.

Prof. Ryszard Lec in the Microsensor Research Laboratory.

Dr. Lec provided assistance and expertise to industry. In collaboration with Control Devices Inc., (Standish, Maine), he is developing an engine oil quality sensor. The target application of the sensor is an on-board inexpensive solid state electronic sensing device to signal the need for an oil change in an automobile. Another project with Control Devices Inc., involves the development of a non-contact torque sensor for an automotive smart steering system which could improve vehicle safety in critical situations. In collaboration with Dupont Inc. an on-line sensor system to monitor the production of polymers under conditions of high temperature and pressure is being developed. Such a sensor could improve the yield and quality of a variety

of polymer products. Potential applications for this sensor include other chemical, food and pharmaceutical industries. A sensor which monitors burning of house waste with microwave energy is being developed in collaboration with a New Hampshire company. Such a waste treatment technology, which is environmentally safe could reduce waste disposal problems in coastal settings and transportation systems. In collaboration with BIODE Inc., of Brunswick, biosensors for detection of pathogens in blood serum are being developed. Here, work is focusing currently on a method to detect antigens produced in the immune system in the presence of cholera bacteria. Also with BIODE, Inc. a sensor for monitoring the electroless and electrochemical plating processes is under development. Such a sensor could improve metal plating techniques which are critical in corrosion protective technologies.

Dr. Lec has started a collaboration with Jet Propulsion Laboratory (JPL) in the area of sensors for planetary exploration. The piezoelectric technology platform allows for the development of miniature, low power and very reliable sensing systems that may monitor physical and chemical properties of various celestial objects such as planets, moons, etc. Dr. Lec was co-organizer of the 1997 IEEE International Frequency Control Symposium (IFCS) in Orlando. He was also elected a member of the Technical Program Committee of the IFCS. Dr. Lec is also a guest associate editor of the special issue of IEEE Ultrasonics, Ferroelectrics and Frequency Control (UFFC) Transactions on Sensors and Actuators.

In addition to his Interim Chair duties, **Mohamad Musavi** has actively been participating in research and teaching in the area of Neural Networks. Mohamad's main research responsibilities are in the *Intelligent Systems* project that is being funded by the Department of Energy EPSCoR Program, Maine Science and Technology Foundation (MSTF), and state industries. This project that started in July 1996 will continue until year 2000 and has a total budget of more than $1.7M. The objective of this project is to assist Maine industries become more competitive by applying intelligent systems technologies in their daily operations. Other members of the Intelligent System Team are **James Patton**, **Ryszard Lec**, and **Bruce Segee** of the Electrcial & Computer Engineering Department and **Hemant Pendse** and **John Hwalek** of the Chemical Engineering Department. The intelligent systems research team has been able to obtain research grants from other organizations, such as National Science Foundation and Argonne National Laboratory, and several industries in support of their efforts in this area. In addition, the department has developed an Intelligent Systems Laboratory that is available for research and education. There are currently 5 graduate and 5 undergraduate students working in the lab.

Mohamad is also continuing his effort with the Northrop Grumman and Rome Laboratory in developing an automatic image registration system. The result of his work has been quite successful and it is being integrated into a system for use for Rome Laboratory.

Mohamad's project in collaboration with The Jackson Laboratory has been completed and the first mouse chromosome database has been created. This database is available for use by other researchers at the ECE website.

This summer, **Jim Patton** (*patton@eece.maine.edu*) and students **Priyantha Jayanetti**, **Jason Bard**, and **Todd Ward** continued work on data acquisition and multimedia power-systems related projects. A project to develop a neural network-based kraft refiner monitor/controller for Champion International grew out of the data acquisition projects. In addition, much effort was spent designing a new power systems lab to be funded by Rockwell Automation with some University matching funds. We also hope to get supplemental funding from NSF. The proposed lab is based on the concept of providing a modern, integrated, power and drive systems lab, including full ethernet networking between lab stations. We will create a PC LAN, a Programmable Logic Controller (PLC) remote input/output(I/O) network, a DeviceNet network, and an independent interconnected "mini" power system. We will have lab stations connected to all three networks via Ethernet.

This laboratory will allow students to observe (and control) interactions between elements of the power system in a way that was not possible before. Each PC will support an automation program that allows real-time monitoring and control of any lab station from anywhere on the LAN (with software permission). The PCs hosting the RSView and DeviceNET software will communicate with PLCs connected to various motors, generators, and other processes. In addition, the PLC's will communicate with simulated processes (e.g. the hydro power plant simulator) running on the PCs. The needed equipment includes personal computers, upgraded PLC's, a modern motor control center, additional power system sensing and control equipment (electronic tachometers and some ac and dc drives), web server software, updated programmable

logic controller software, and PC/PLC interface hardware.

During the summer, Jim was asked to serve as Interim Director of Instructional Technologies while a national search is underway. Responsibilities include management of the University telephone system, a portion of the campus computer network, the computer store, the computer repair operation, the Help Center, audio-visual services, and video production services.

Bruce Segee (*segee@eece.maine.edu*) continues to be active in teaching as well as the Instrumentation Research Laboratory. Areas of particular interest include fuzzy logic, neural networks, and hierarchical control systems. Work in the laboratory includes industrial automation, intelligent instrumentation, neural networks for sensor array calibration, and assistive technology for children with disabilities. The work in the laboratory has included the use of PCs, PLCs, and embedded controllers.

Prof. Bruce Segee with graduate student Hui Wang in the Instrumention laboratory.

Currently the laboratory is working on a number of projects involving the use of embedded controllers, sensors, and PCs running Windows '95. Multi-tasking and inter-process communication allow existing software packages to be utilized when developing new applications. Current projects include the development of reusable software packages for artificial neural networks and fuzzy logic. Additionally, work is underway to combine data gathering and control with the world-wide web. The goal is to produce automation systems whose front-end is an ordinary web browser such as Netscape or Internet Explorer. This would allow virtually any computer to be used for user interface, would greatly reduce the time necessary to train operators and supervisors in the use of the system, as well as make system maintenance and upgrading significantly easier. Bruce has continued to receive support from a variety of sources locally and nationally. Additionally, Bruce has worked with students supported by NSF Young Scholars Program, NSF Research Experiences for Undergraduates, Upward Bound, and other programs for high school and undergraduate students. A major emphasis of Bruce's research is focused on finding solutions to problems faced by local industry, leading to research projects that involve students in the solution to real-world problems, that directly benefit the local economy, and that demonstrate the role that the University plays in the economic health of the State.

John F. Vetelino (*vet@eece.maine.edu*) and his research group which currently consists of 5 PhD students, 5 MS students and 8 undergraduates, continue to work on basic and applied research in gas sensors, biosensors, corrosion sensors and water quality sensors. Each area involves collaboration with physists, chemists, chemical engineers, civil engineers, environmental engineers or medical doctors. The sensor work is supported by NSF, the BIODE Corporation, Department of Energy, National Institute of Health, and Argonne National Laboratory.

Dr. Vetelino is on the organizing committee for the 1998 IEEE Ultrasonics Symposium to be held in Japan in October 1998, and the International Chemical Sensor Meeting to be held in Beijing, China. Dr. Vetelino

is also a guest associate editor of the special issue of IEEE Ultrasonics, Ferroelectrics and Frequency Control (UFFC) Transactions on sensors and actuators.

Two small businesses, namely, BIODE and SRD Corp., which were incubated from the sensor research at the University of Maine, have recently been successful in obtaining several small business innovation (SBIR) grants totaling over 4 million dollars from NSF, Dept. of Energy, National Institute of Health, Dept. of the Army and the State of Maine. These companies, which are located in Hermon and Orono respectively, employ several former and current UMaine students on a part time or full time basis.

Dr. Vetelino received an NSF grant that supports undergraduate research in the Electrical and Computer Engineering Department. This ten week summer program involves undergraduates from the University of Maine and other U.S. universities in departmental research activities, some of which are industrially sponsored. At the end of the summer, students write reports describing their research activities and also make presentations. This award represents the seventeenth award Dr. Vetelino has received from NSF to support undergraduate students in research. Dr. Vetelino has also received an NSF equipment award and Environmental Protection Agency Grant. The NSF grant will upgrade the photolithography laboratory to a state-of-the-art facility for the fabrication of a large class of state-of-the-art microsensors and the EPA grant involves the development of a nitric oxide/ammonia sensor for application in fossil fuel combustion processes.

Al Whitney (*whitney@eece.maine.edu*) has been our sole faculty in charge of teaching the electronic course sequence. His strong teaching skills and devotion to this area has attracted many electronics companies in hiring our students. The department does, however, need another faculty member in this area. This would not only be a great help to Al but also to research areas such as communications and microsensors. Al's principal goal in the electronics portion of the curriculum is to reach a satisfactory balance of a sound understanding of the basic device and circuit theory with the practical application of that theory to the design of working circuits. The belief that a good understanding of analog circuit behavior is important to both digital and analog design permeates the program. In the ongoing process of trying to keep the syllabus current and relevant we are exploring the idea of a temporary faculty position that would be filled by someone on "sabbatical" for a year from industry. This individual would have current experience in bringing simulated and "paper" designs through working silicon. The envisioned position hopefully would become a revolving position with a new representative from a new company each year. Such an approach obviously requires an individual with a sincere interest in becoming directly involved in engineering education as well as a corporation that sees a favorable cost/benefit from closer ties to the education process. We invite your comments and questions.

Computer and Network News

Bruce Littlefield (*brucel@eece.maine.edu*) and **Andrew Sheaff** (*sheaff@eece.maine.edu*) continue to maintain and upgrade the ECE Department computers and network infrastructure. With the help of DOE/EPSCoR "Intelligent Systems" project, the department has added new equipment to support distance education and multimedia collaboration in heterogeneous networked environments using multicast-based applications over the internet. Bruce and Andy are investigating interoperability and bandwidth issues for this project.

New equipment includes a dual processor SGI Origin 200 server with 256MB of RAM, 38GB of disk and MediaBase software, two SGI O2 workstations and software, a color projector, digital camcorder, scanner and OCR software, voice recognition software and PC videoconferencing tools and hardware.

The network has been upgraded to use Fast Ethernet switches with Fast Ethernet links to all faculty office PCs, the SGI workstations and the campus backbone. The PC cluster machines and the DEC Alphas continue to use switched Ethernet and CDDI. Andy is also involved in developing Linux kernel drivers for the Mobile Robot project and IEEE-488 bus hardware in the Communications Laboratory.

The department is pleased to announce the contribution of Microsoft software and licenses for the PC clusters due to efforts of **Scott Binette (BSEE '87)**. Scott is employed by Microsoft as a Software Engineer. Over the last two years, he has taken advantage of employee discounts and Microsoft matching gift program to obtain operating systems, compilers, application programs and licenses for the department that are worth

well in excess of $15,000. Thank you Scott!

Alumni/ae News

Peter Gaboury (BSEE '89) and his wife Magali are proud to announce the birth of their first child, Johanna Clemence Gaboury, on the 15th of February in Aix en Province France. Peter recently moved from being a Process Engineer to the position of Equipment Engineering Manager at SGS Thomson in Rousset, France. His work involves organization, coordination between the equipment suppliers, controlling costs, etc. Last year he published a paper in the European Semiconductor (Oct 1996) entitled "Techniques to Measure Defect density in Photolithography". He was also on the worldwide advisory board for 'Interface 96', a conference on Microlithography. Peter has been with SGS Thomson over three years. Magali currently is a process engineer at SGS (with an office right behind Peter's: just to keep track of him during the day) and she is expected to take up an engineering position in a SGS Thomson's new 8 inch fab which is under construction at Rousset.

Steve Waldstein (BSEE '77) joined Quadic Systems in So. Portland after working for several IC design companies over the last 18 years. After graduate school, he worked at the MITRE Corporation for 5 years in the Signal Processing and Electronic Warfare Department. In '84 Steve joined VLSI Technology in Massachusetts till late '87 as a Design Center Manager. Later, he worked for Kendall Square Research (a failed super computer startup) and was the Manger of IC Development where they designed a 128 Processor Shared Memory RISC MIMD machine with 6 custom chips that implemented a Superscaler RISC Processor. In 1990, Steve left Kendall and rejoined VLSI Technology. In '92 Steve moved to San Jose, CA to become VLSI's Director of ASIC Development. While at VLSI he brought up VLSI's 0.8, 0.6 and 0.5 micron ASIC Standard Cell and Gate Array products.

After a few years in California Steve decided to move back east. He had some subcontract work going on with Quadic and decided to join them to return to New England.

Chris Fournier (BSEE '93) left Texas Instruments, Dallas to work for Cyrix Corporation in Longmont, Colorado (near Boulder) in the CPU technical marketing division as Senior Technical Marketing Engineer. According to Chris, the work is a little more high pressure than TI, but there's a lot more to learn and he enjoys it. Musically, Chris has released five CDs of his compositions under the Fonya psuedonym and has also been featured on several compilation CDs with other artists from around the world. Both Chris and his wife Karen, enjoy their new location in Colorado especially the "great camping, hiking and biking" area.

Jason Lavoie (BSEE '96) is Director of Engineering for Maine Internetworks, a company he and two other consultants started up two years ago. Maine Internetworks, known simply as Mint (taken from its Web address mint.net), is an Internet service provider based in Winslow. Incorporated two years ago and led by its three principals - Lavoie, and the brother and sister consulting team of Paul Booker and Vicki Clewley - Mint has grown to be a company employing more than 35 full-time employees working in towns and cities throughout central Maine. It has developed into a small business success story that is directly attributable to vision and cutting-edge talents.

Nathan March (BSEE '97) and **Andrew Jordan (BSEE '97)**, have joined Quadic Systems, in So. Portland, as Associate Design Engineers.

Chris Busick (BSEE '93 MSEE '95) joined CLARiiON of Southboro, MA in May 1997 as a senior software engineer, working with the "Systems Integration Tools Group." CLARiiON (a Data General company), is a supplier of open RAID-based disk arrays, supporting all major open systems platforms. At CLARiiON, Chris develops, implements and maintains software on different UNIX and Windows-NT platforms. The software Chris designs provides different groups within CLARiiON with the tools needed for array testing, configuration and installation. Prior to joining CLARiiON, Chris worked at the Foxboro Company of Foxboro, MA as an application engineer in the Customer Engineering Group.

Heather Blease (Heather Deveau, BSEE '85) is the President of EnvisioNet Computer Services. The company, which was founded by Heather three years ago, provides technical support services to software publishers and Internet service providers, worldwide. The company currently employs 85 people in its Augusta and Winthrop locations and plan to add a third facility early in 1998.

External Funding Expenditures

The following is a list of external funding available for expenditures between July 1996 and June 1997. Descriptions of many of these projects can be found in the Faculty Activities section. If you would like to know more about any of these grants, please contact us.

PRINCIPAL INVESTIGATORS	TITLE	SPONSOR	AMOUNT
Hummels	Atlantic Undersea Test	Naval Undersea Warfare.	24,656
Hummels	Distortion Compensation for Digital Receivers	ARPA	93,262
Hummels	Develop multi-GHz Sampling Capability	Dept. of Army	111,637
Lec	Improved Deposition Controllers	BIODE,Inc.	42,633
Lec	Development of Automobile Engine Oil quality sensors	Control Devices, Inc.	30,952
Lec	Feasability Study of Acoustic Sensing Techniques	Wastech, Int.	6,340
Lec	Monolithic Resonator Sensor (MRS)	BIODE,Inc.	19,404
Lec	Non-contact Torque Sensor for Automobile applications	Control Devices	53,222
Musavi	Development of Intelligent Systems Expertise	DoE/EPSCoR	275,000
Musavi	Prediction of Wood Pulp K# - Year 2	S.D.Warren	15,000
Musavi	Intelligent Controls Systems for Pulp & Paper Industry	Argonne/DoE-OIT	114,000
Musavi	Prediction of Wood Pulp K# with Neural Networks	NSF	40,721
Musavi	Image Registration Sensivity Analysis	Northrop Grumman	49,295
Musavi	Intelligent Process Control.. Ceiling Boards	Armstrong	20,000
Patton	Kraft Refiner Monitoring System	Champion Internatl	10,878
Segee	Lumber Tally Repair	Middleton Building Supply	1,400
Segee	Intelligent Lumber Tally System for Mobile Lumber Stacker	Sonoco Products	20,607
Segee	Automatic Hand Tally/Report System	Middleton Building Sply.	8,958
Segee	Flowmeter Revision	CMP	750
Sheaff	Orono/Veazie School District Computer Network Design	Orono/Veazie Schl. Dist.	5,000
Vetelino	Piezoelectric Sensors Fabrication Equipment	NSF	10,000
Vetelino	Undergraduate Research Participation in EE	NSF	59,951
Vetelino	Prototype Acoustic Fluid Microsensors	BIODE,Inc.	52,942
Vetelino	Piezoelectric Sensors Fabrication Equipment	NSF	110,800
TOTAL			**1,177,410**

Publications: July 1st 1996 - June 30th 1997

JOURNALS

D. Hanselman , "Effect of Skew, Pole Count, and Slot Count on Brushless Motor Radial Force, Cogging Torque, and Back Emf," *IEE Proceedings, Power Applications*, Vol. 144 No.5, pp.325-330, 1997.

J.F. Vetelino, R. Dahint, J. Schumacher, F. Josse, M. Grunze and J. Andle, "On the Mass Sensitivity of Acoustic Plate Mode Sensors," *Sensors and Actuators A*, Vol. 53, No. 1-4, pp. 243-248, 1996.

J.F. Vetelino, J.D. Galipeau, K. Snow, and L.J. LeGore, "The Integration of a Chemiresistive Film Overlay with a Surface Acoustic Wave Microsensor," *Sensors and Actuators B35*, pp. 158-163, 1996.

J.F. Vetelino, J.J. Caron, J.C. Andle, J.D. Galipeau, and B. Allen "Temperature Stable Piezoelectric Substrates for Surface Acoustic Wave Gas Sensors" *Sensors and Actuators Journal B35*, pp. 141-145, 1996.

J.F. Vetelino, D.J. McAllister, J.C. Andle, and M.G. Schweyer "An Acoustic Plate Mode Sensor for Aqueous Mercury," *Sensors and*

Actuators Journal B35, pp. 170-175, 1996.

J.F. Vetelino, L.J. LeGore, K. Snow, and J.D. Galipeau "The Optimization of a WO3 Film for Applications in a SAW Gas Sensor," *Sensors and Actuators Journal B35*, pp. 164-169, 1996.

J.B. Patton and P. Jayanetti, "The Making of Multimedia Power Systems Control and Simulation Labware," *IEEE Transactions on Education*, pp. 314-320., 1996.

R.M. Lec, "Acoustic Wave Sensors", *Archives of Acoustics*, No. 2, pp. 179-194, Oct. 1996.

CONFERENCE PROCEEDINGS

D.Hanselman, "Cogging Torque Relationships for Skewed and Unskewed Brushless DC Motors", *IMCSD Symposium Proceedings*, pp 123-129,San Jose, CA, July 22-24, 1997.

A. Fern , J. Miranda, M.T. Musavi, and D. Coughlin, "Pulp Digester Level Prediction Using Multiresolution Networks of Locally Active Units," *Proceedings of International Conference on Neural Networks (ICNN)*, Houston, TX, June 9-12, 1997.

J.R. Hull, H.P. Pendse, and M.T. Musavi, "A Neural Network Algorithm using Wavelets and Auto Regressive Inputs for System Identification," *Proceedings of International Conference on Neural Networks (ICNN)*, Houston, TX, June 9-12, 1997.

A. Fern, M.T. Musavi, and J. Miranda, "Automatic Extraction of Drainage Networks from Digital Terrain Elevation Data: A Local Network Approach," *Proceedings of International Conference on Neural Networks (ICNN)*, Houston, TX, June 9-12, 1997.

M.T. Musavi, J. Miranda, A. Fern, and D. Coughlin, "Prediction of Wood Pulp Digester Level with Neural Networks," *Proceedings of the 1997 NSF Design and Manufacturing Grantees Conference*, University of Washington, Seattle, WA, pp. 181-182, January 7-10, 1997.

H.P. Pendse, M.T. Musavi, G. Sirdeshpande, and K.P. Kehrer, "Sensors for Industrial Slurries as Virtual Analyzers of Mat Quality," *Conference Proceedings Control of Particulate Processes IV, ENGINEERING FOUNDATION-TUDelft*, Editors H.J.M. Kramer and G.M.H. Meesters, pp223-227, April 6-9, 1997.

J.F. Vetelino, J.C. Andle, and J.J. Caron, "Surface Acoustic Wave Substrates for High Temperature Applications," *IEEE Frequency Control Symp.*, pp. 222-227,,Honolulu, HI, June 4-8 1996.

 J.F. Vetelino, J.C. Andle and M.G. Schweyer, "Acoustic Plate Mode Properties of Rotated Y-cut Quartz," *IEEE Frequency Control Symp.*, pp. 532-540, Honolulu, HI, June 4-8, 1996.

J.F. Vetelino, J.C. Andle and M.G. Schweyer, "Acoustic Platte Mode Properties of Rotated Y-Cut Quartz," *IEEE Ultrasonics Symposium*, pp. 971-976, San Antonio, TX, November, 1996.

J.F. Vetelino, R Lec, W. Lepuschenko, and D.J. McAllister, "A Bulk Acoustic Wave Homogeneous Immunosensor's Sensitivity, Time Response and Signature to Immune and Non-immune Solutions," *Sixth International Meeting on Chemical Sensors*, National Institute of Standards and Technology, Gaithersburg, MD, July 22-25, 1996.

J.F.Vetelino, B.T. Marquis, W.E.Bruehs, and D.J. Frankel "A Study of Metallic Corrosion Using a Surface Acoustic Wave Sensor," *Sixth International Meeting on Chemical Sensors*, National Institute of Standards and Technology, Gaithersburg, MD, July 22-25, 1996.

J.F. Vetelino, B. Marquis, D.J. Frankel, and W.E. Bruehs "A Study of Metallic Corrosion Using a Surface Acoustic Wave Sensor" *Twenty-third Annual Conference on Quantitative Nondestructive Evaluation*, Bowdoin College, Brunswick, ME, 1996.

J.F. Vetelino, J.C. Andle, M.G. Schweyer, "Acoustic Plate Mode Properties of Rotated Y-Cut Quartz," *1996 IEEE Ultrasonics Symposium*, pp. 971-976, San Antonio, Texas, Nov. 1996.

J.F. Vetelino, J.J. Height, D. Huyah, M.G. Schweyer, J.J. Weaver, J.C. Andle and D.J. McAllister, "Comparison of Surface Transverse Wave (STW) and Shear Horizontal Acoustic Plate Mode (SHAPM) Devices for Biochemical Sensors," *Scientific Conference on Chemical and Biological Defense Research*, Edgewood Research, Development and Engineering Center (ERDEC), US Army Aberdeen Proving Ground, MD., Nov. 1996.

J.F. Vetelino, J.J. Caron, R.B. Haskell, D.G.Libby, and C. J. Freeman, "A Surface Acoustic Wave Mercury Vapor Sensor," *IEEE Frequency Control Symposium*, Orlando, pp. 133-139, FL., May 28-30, 1997, 1997.

J.F. Vetelino, M.G. Schweyer, J.T. Weaver, J.C. Andle and D.J. McAllister, "Comparison of Surface Transverse Wave (STW) and Shear Horizontal Acoustic Plate Mode (SHAPM) Devices for Biochemical Sensors," *IEEE Frequency Control Symposium*, pp. 147-155, Orlando, FL., May 28-30, 1997.

J.F. Vetelino, J.J. Caron, T.D. Kenny, L.J. LeGore, D.G. Libby and C.J. Freeman, "A Surface Acoustic Wave Nitric Oxide Sensor," *1997 IEEE Frequency Control Symposium*, pp. 156-162, Orlando, FL., May 28-30, 1997.

D.J. Rawnsley, D.M. Hummels, and B.E. Segee, "A Virtual Instrument Bus Using Network Programming," *1997 ASEE Annual*

Conference Proceedings, Milwaukee, WI, June 1997.

S. Dunning, B.E. Segee, and V.M. Allen, "An Expert-Based Assessment Software Program for Industrial Manufacturers," *1997 ASEE Annual Conference Proceedings*, Milwaukee, WI, June 1997.

B.E. Segee, and M. Amos, "Artificial Neural Networks Using Microsoft Excel for Windows 95," *ASEE Annual Conference Proceedings*, Milwaukee, WI, June 1997.

B.E. Segee and V.M. Allen, "Software Application Design Using Visual C++ and OLE," *ASEE Annual Conference Proceedings*, Milwaukee, WI, June 1997.

B.E. Segee and V.M. Allen, "Factory Automation Emulator Design Using Object Oriented Programming," *ASEE Annual Conference Proceedings*, Milwaukee, WI, June 1997.

B.E. Segee and K. LeBlanc, "Industrial Automation Using OLE," *ASEE Annual Conference Proceedings*, Milwaukee, WI, June 1997.

D.J. Rawnsley, D.M. Hummels and F.H. Irons, "A Virtual Instrument Bus Using Network Programming," *Proc. IEEE Instr & Meas Tech Conf (IMTC97)*, pp. 694-697, Ottawa, Canada, May 1997.

J.H. Larrabee, D.M. Hummels, and F.H. Irons, "ADC Compensation Using Sinewave Histogram Methods," *Proc. IEEE Instr & Meas Tech Conf (IMTC97)*, pp. 628-631, Ottawa, Canada, May 1997.

D.M. Hummels, D. Gerow and F.H. Irons, "A Compensation Technique for Sigma-Delta Analog-to-Digital Converters," *Proc. IEEE Instr & Meas Tech Conf (IMTC97)*, pp. 1309-1312, Ottawa, Canada, May 1997.

J. Hammond, R.M. Lec, X. Zhang and L. Prager ,"An Acoustic Automotive Engine Oil Quality Sensor", *Proc. of the Ninth International Conference on Solid-State Sensors and Actuators Transducers'97*, pp. 1343-46, Chicago, June 16-19, 1997.

R.M. Lec, M.G. Schwyer, J.A. Hilton, J.E. Munson, J.C. Andle, J.M. Hammond, "A Novel Monolithic Piezoelectric Sensor", *Proc. of the IEEE International Frequency Control Symposium*, pp. 32-41, Orlando,FL, May 29-31, 1997.

R.M. Lec, X.J.Zhang, D.G.Libby, L.A. Prager, "An Acoustic Engine Oil Quality Sensor", *Proc. of the IEEE International Frequency Control Symposium*, pp. 72-80, May 29-31,Orlando,FL, 1997.

BOOKS

Mastering MATLAB 5. Duane Hanselman with Bruce Littlefield, Prentice Hall, to appear 12/97.

The Student Edition of MATLAB User's Guide, version 5. Bruce Littlefield with Duane Hanselman, Prentice Hall, 4/97.